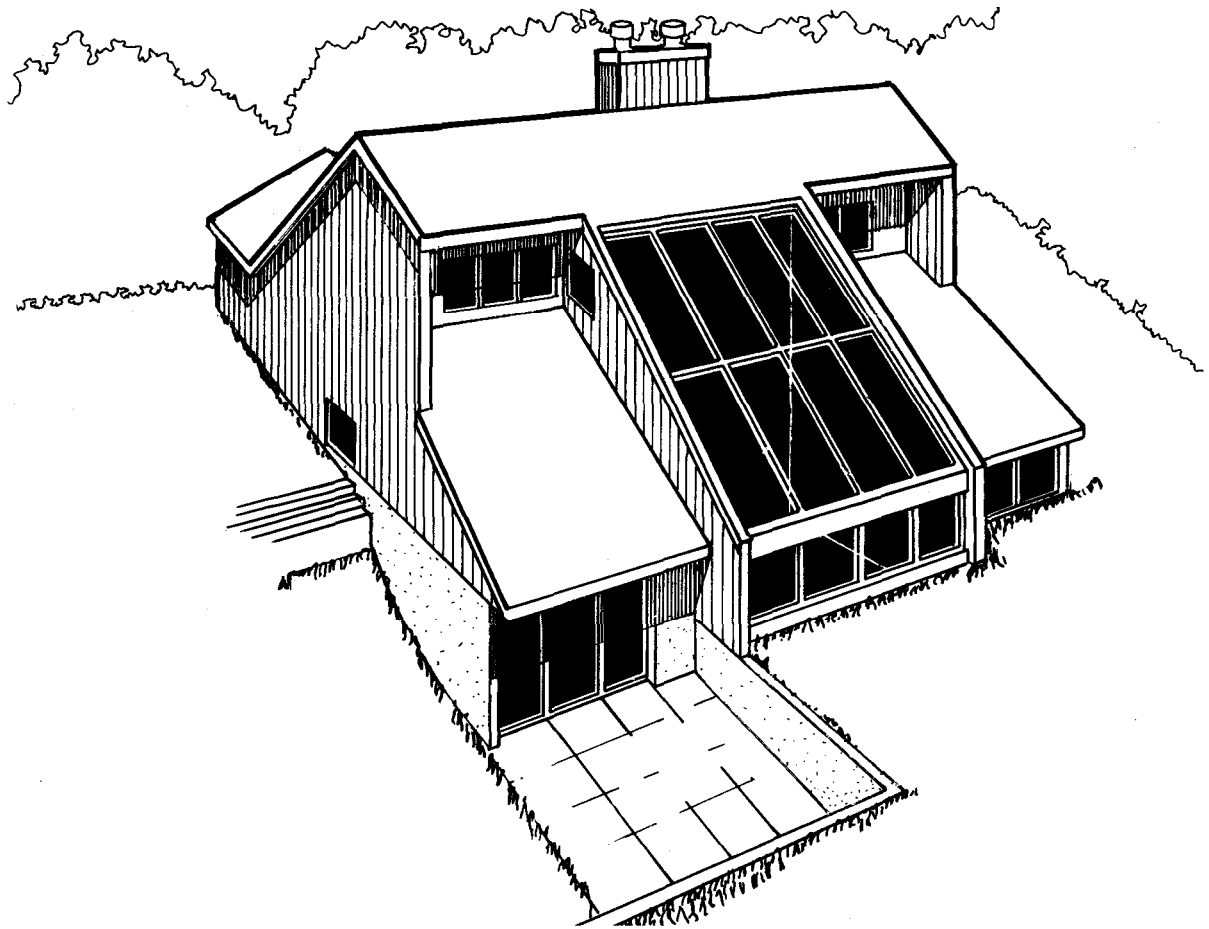
Aurora, CO



Builder: Wexford Corporation, Englewood, CO

Designer: Seracuse Lawler & Partners, Inc., Denver, CO

Solar Designer: Seracuse Lawler & Partners, Inc.

Price: $70,000

Net Heated Area: 1514 ft²

Heat Load: 110.5 x 10⁶ BTU/yr

Degree Days: 6277

Solar Fraction: 75%

Auxiliary Heat: 2.86 BTU/DD/ft²

Passive Heating System(s): Direct gain

Recognition Factors: Collector(s): South-facing panels, sliding glass doors, 504 ft² **Absorber(s):** Concrete slab floor covered with brick pavers, masonry wall **Storage:** Concrete slab floor, brick pavers, masonry wall—**capacity:** 17,443 BTU/°F **Distribution:** Radiation, forced and natural convection **Controls:** Operable curtain, vents, thermostats

Back-up: Gas furnace (65,000 BTU/H), woodburning stove

Domestic Hot Water: Optional

South-facing **collectors** have been provided for all major living areas of this 3-bedroom solar design. Each of the two upper-level bedrooms has four windows for heating individual storage masses, while the firstfloor master bedroom has three windows and no storage. There are three sliding glass doors **collecting** heat in the dining room. The family room, located between the dining room and master bedroom, has eight vertical glass **collectors** and a sloping roof made entirely of Kalwall Sunwall panels. These panels have an R-value of 4.1, which is increased to R-10 with the use of integrated roll-out window quilts at night. All windows are double glazed and have fixed overhangs.

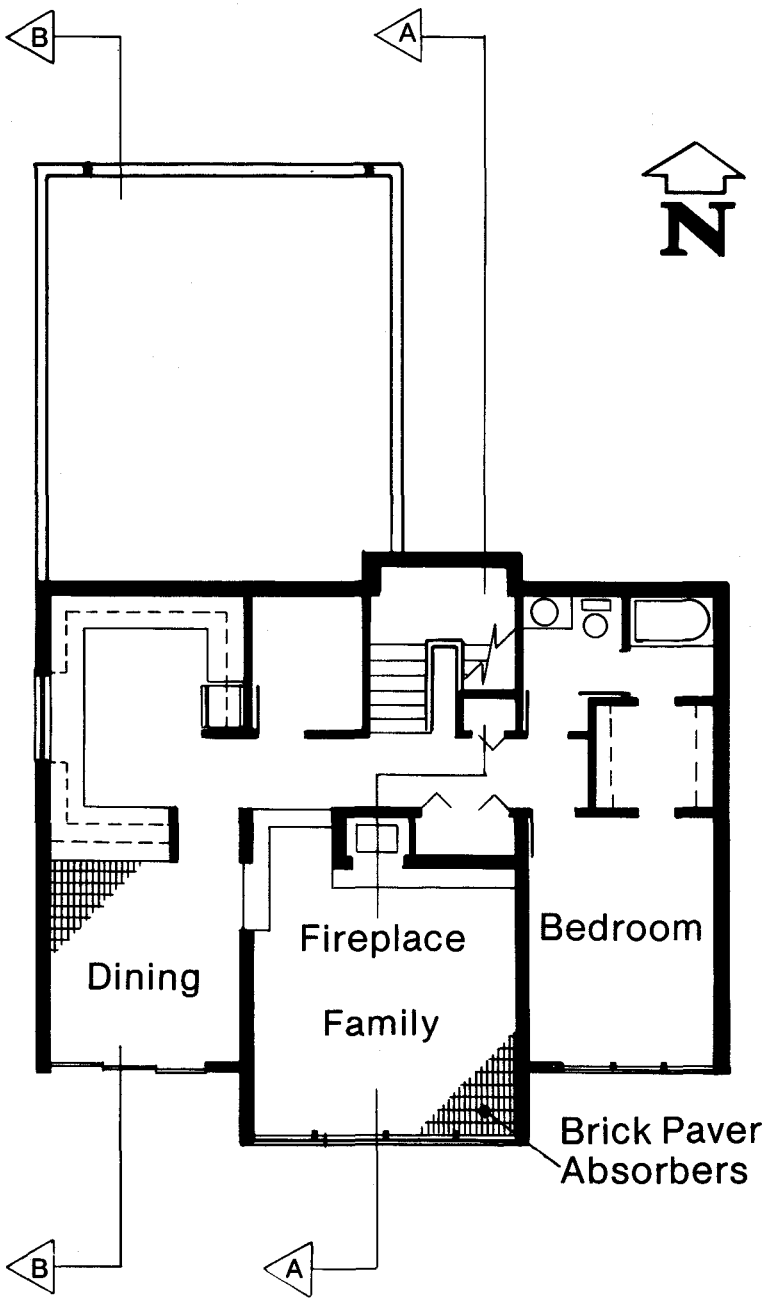
In the family room, there are two surfaces capable of **absorbing** and **storing** a significant amount of heat: an 8-inch concrete slab floor covered with brick pavers, and the 8-inch masonry wall at the north end of the room. The dining room has only the brick-covered slab floor. In the upstairs bedroom there are large brick-covered window sills **absorbing** heat for the 6-inch concrete **storage** slab beneath.

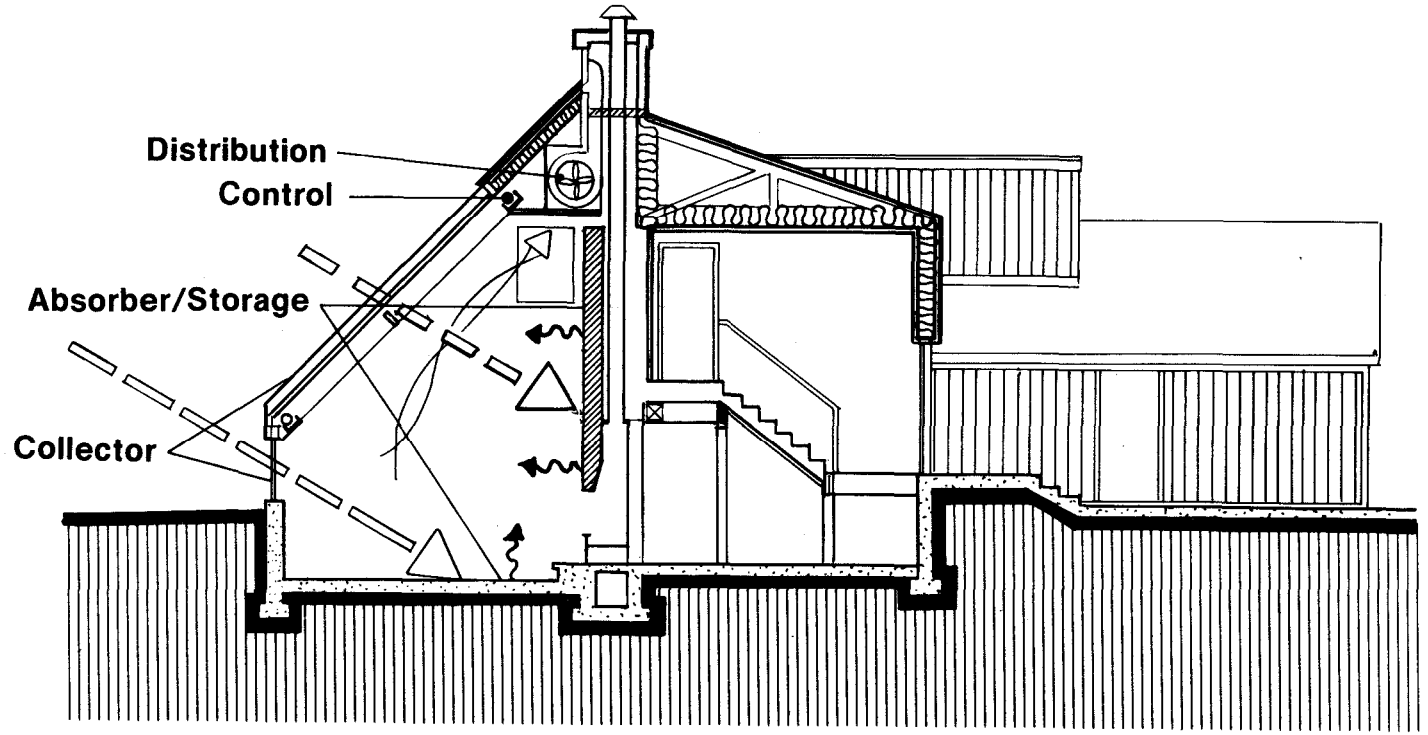
Backing up these solar systems in the winter and at night are a woodburning stove (within the masonry wall of the family room) and a gas furnace. The furnace is equipped with an air handler that can operate independently of the heater to evenly

distribute heat radiated from storage masses. This is accomplished by the return air intake in the ridge above the family room where heated air, which gathers there by natural convection, is drawn down into the furnace by the air handler and supplied to the rest of the house through floor and wall registers. Because the stove's flue closely parallels this air intake tube within the chimney, use of the stove will significantly raise the temperature of air being drawn down for distribution. As the stove draws its combustion air from the outside, its use will not diminish internal pressure. During extreme cold, the gas heater will activate automatically until the thermostat is satisfied. Heat loss at night is **controlled** by the window quilts that cover the Kaiwall panels, sliding insulation panels on the upper-level bedroom windows, and conventional draperies on all other vertical glass.

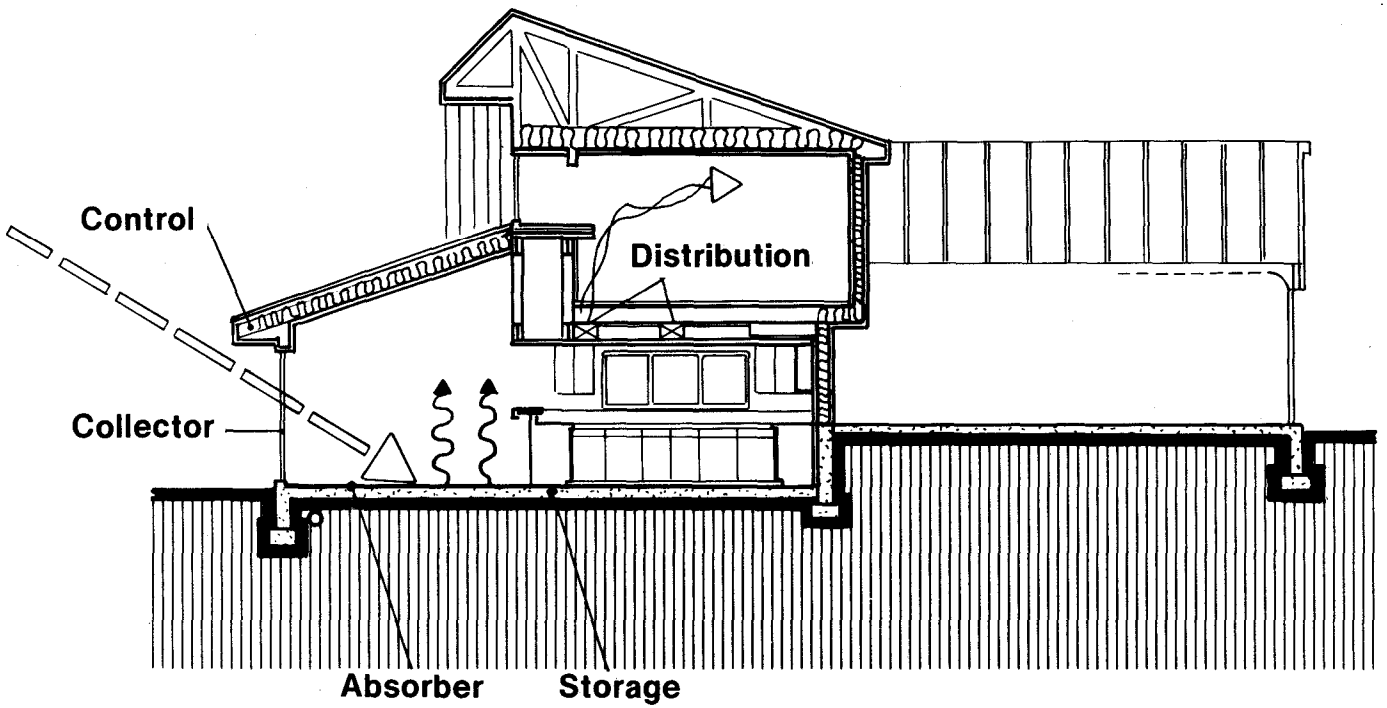
In summer, when the temperature in the family room rises above 18°F, a thermostat will open a motorized damper in the ridge to exhaust hot air. The damper also opens if the outside thermostat indicates outside temperature to be about 68°F. To aid in ventilation, there is a manually opened electric fan box within the plenum with intake vents along the top of the skylight. When the window quilts are drawn to prevent solar gain, there is an air space left between them and the glazing. The fan draws the hot air out from this space, which in turn draws cooler air in from vents at the bottom of the glazing. Overheating is further **controlled** by use of the same moveable insulation and draperies used to control heat loss.

Earth berming has been used on all sides to help stabilize interior temperature. To reduce wind infiltration, buffer spaces (closets, utility spaces, etc.) have been located along the north wall of the house; the garage on the northwest side protects against prevailing northwest winds. Attic insulation is R-38, and walls are R-19.





A-A



B-B

This plan was taken from the book
“Passive Solar Homes – 91 new award-winning, energy-conserving single-family homes”,
The U.S. Department of Housing and Urban Development, 1982

These homes were the winners of HUD’s fifth (and final) cycle of demonstration solar homes. The 91 winning homes were selected from 550 builder applicants.
This was a time of great interest and activity in the passive solar home designs – many of the winning homes show a level of innovation not found in most of today’s passive solar designs.

www.BuildItSolar.com